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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/780,025      | 02/17/2004  | Wenbin Gu            | 8540G-000187        | 9272             |

27572 7590 08/24/2006

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EXAMINER

WALKER, KEITH D

ART UNIT PAPER NUMBER

1745

DATE MAILED: 08/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/780,025

Applicant(s)

GU ET AL.

Examiner

Keith Walker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 13 June 2006.  
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-3,5-12,15-29 and 31-50 is/are pending in the application.  
4a) Of the above claim(s) 24-29 and 31-50 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-3,5-12 and 15-23 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Remarks*

Claims 1-3, 5-12, 15-29 & 31-50 are pending in the application.

Claims 1-3, 5-12 & 15-23 are pending examination; the remaining claims are withdrawn from consideration.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-3, 5-12, 15-21 & 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Publication 2003/0235735 (Miyazawa) in view of US Patent 5,432,023 (Yamada).

Miyazawa teaches an electrochemical cell having: a membrane electrode assembly (MEA) comprising an anode and cathode (Figure 1, #20); an electroconductive element comprising an impermeable electrically conductive element (ECE) having a major surface facing the cathode (Figure 1, #4b) and a porous liquid distribution media (LDM) disposed along the major surface defining flow channels for transporting gas and liquid to and from the cathode (Figure 2, #14). An electrically conductive fluid distribution layer (FDL) is disposed between the liquid distribution media and the cathode for transporting gases and liquids between the cathode and the flow channels (Figure 1, #21b). The FDL and LDM are constructed and arranged to

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transport liquids accumulating within the cathode through the FDL to the LDM. The ECE and LDM are arranged together to define the flow channels. The LDM forms an electrically conductive path between the ECE and FDL. The LDM is more hydrophilic than the FDL, overlies substantially the entire major surface of the ECE, and is disposed in regions along the major surface defining separate spaced-apart flow channels. The LDM has an undulated configuration of peaks and valleys and internally redistributes liquid water. The electroconductive element also comprises a second ECE having a second surface facing the anode, a second LDM along regions of the second surface, and a second FDL disposed between the electroconductive element and anode and in contact with the second LDM. The LDM is composed of a conductive hydrophilic material, for example carbon black. The porous fluid distribution layer (FDL) is in physical contact and fluid communication with an electrode and the porous LDM layer is more hydrophilic than the FDL and draws water from the electrode through the FDL (Page 2, [0018]–[0029]; Page 3, [0033], [0036], [0037]; Page 5, [0056], [0057]).

Miyazawa is silent to the size of the pores for the fluid distribution layer and the liquid distribution layer.

Yamada also teaches a fuel cell system with an impermeable metal separator and layers of conductive porous material with differing pore sizes (10:40-60, 16:25-40). Having materials with two different pore sizes pulls the liquid in the direction of the smaller pores. By varying the pore diameter, the rate or force with which the liquids are drawn in the direction of decreasing pore diameter can be changed. With respect to the cathode, the conductive porous material next to the cathode will have a pore diameter

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larger than the porous material next to the separator so the water is pulled away from the cathode (39:2-27). The pore sizes dictate what liquid or gas is passed through the structure and which direction the liquid or gas passes (24:14-20, 39:5-10). The size of the pores is dependent on the material used as the porous layer and the type of fluid to be transported by the pores. Yamada teaches pore sizes of 30 microns and a formula, such that the pore sizes can be varied to optimize factors such as the fluid travel speed and the fluid volume transported (39:15-50). A nickel mesh is used for the conductive material (47:35-45).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the porous layers of Miyazawa with the pore size structures taught by Yamada to improve the efficiency of the fuel cell by pulling the by-product waste, such as water, away from the electrodes to produce a more efficient fuel cell. The pore sizes can be adjusted for the material used, the application and the force with which the fluid will be withdrawn from the electrode material by applying the formula taught (39:30-40).

Regarding claims 17, 19, 21 & 23, these claims are seen as product-by-process limitations and even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. "The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process" (MPEP 2113). While these limitations have been considered, they have not been given

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patentable weight. The final product as taught by Miyazawa and Yamada as discussed above is considered obvious over the product of the instant application.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyazawa et al. (US 2003/0235735) and US Patent 5,432,023 (Yamada), as applied to claim 1 above, further in view of Davis (US 2002/0001743).

Miyazawa and Yamada teach the elements of claim 1 as discussed above but fail to teach the impermeable electrically conductive element formed of Al, Ti, stainless steel, or alloys or mixtures thereof.

Davis teaches that forming bipolar plates using metals with high electrical and thermal conductivity, such as Al, Cu, and Ti, results in plates with electrical conductivity 500 times better and thermal conductivity double that of graphite. This can reduce the effect of localized heating due to areas of localized high current density and voltage drop, such as membrane dry-out (Page 2, [0007], [0008]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made would have used a bipolar plate made of Al or Ti as taught by Davis in the electrochemical cell as taught by Miyazawa and Yamada in order to

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reduce localized heating caused by areas of high current density and large voltage drop.

### ***Response to Arguments***

Applicant's arguments filed have been fully considered but they are not persuasive. Applicant argues Miyazawa is silent regarding the electrical conductivity of the ribs. As stated above, Miyazawa teaches the separator "should display electrical conductivity" ([0030]) and "materials should not display large impediments to conductivity" ([0031]). Miyazawa also teaches an electrically conductive hydrophilic liquid distribution media (LDM) layer ([0036]), meeting the new limitation of amended claim 1.

Applicant argues Yamada teaches away from the claimed subject matter since the wicking material used by Yamada is non-conductive material and the claimed liquid distribution media (LDM) is electrically conductive. The electrically conductive LDM layer is taught by the Miyazawa reference and the Yamada reference is used to teach the principals of having materials with two different pore sizes to draw liquid in a particular direction with a particular force.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Keith Walker whose telephone number is 571-272-3458. The examiner can normally be reached on Mon. - Fri. 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

K. Walker

  
PATRICK JOSEPH RYAN  
SUPERVISORY PATENT EXAMINER